

WHAT IS CLAIMED IS:

1. A computer network appliance, comprising:
a hot-swappable CPU module;
a hot-swappable power module;
5 a hot-swappable ethernet switch module; and
a backplane board having a plurality of hot swap mating connectors,
wherein each of the CPU module, the power module and the ethernet switch module
includes a hot swap connector for connecting with a specific hot swap mating connector of
the backplane board.
- 10 2. The computer network appliance of claim 1, further comprising a chassis providing
physical support for the CPU module, the power module, the ethernet switch module and the
backplane board.
3. The computer network appliance of claim 2, wherein the chassis comprises caddies
providing air flow from the front to the rear of the chassis.
- 5 4. The computer network appliance of claim 2, wherein the chassis comprises bays
and slot guides to facilitate mounting and removal of the modules and to ensure proper
alignment between the hot swap connectors of the modules and the hot swap mating
connectors of the backplane board.
- 20 5. The computer network appliance of claim 1, further comprising a power connector
and a data input/output connector.
6. The computer network appliance of claim 2, wherein the modules and the chassis
are free of on/off switches.

7. The computer network appliance of claim 1, wherein each of the hot swap connectors of the modules comprises pin connections arranged in a specific pattern and includes ground pins, pre-charge power pins, power pins and signal pins.

8. The computer network appliance of claim 7, wherein the ground pins of a hot swap connector of a module make contact with corresponding ground elements of a hot swap mating connector of the backplane board.

9. The computer network appliance of claim 8, wherein the pre-charge power pins of the hot swap connector of the module make contact with corresponding pre-charge power elements of the hot swap mating connector of the backplane board after the ground pins have made contact.

10. The computer network appliance of claim 9, wherein the power pins of the hot swap connector of the module make contact with corresponding power elements of the hot swap mating connector of the backplane board after the pre-charge power pins have made contact.

11. The computer network appliance of claim 10, wherein the signal pins of the hot swap connector of the module make contact with corresponding signal elements of the hot swap mating connector of the backplane board after the power pins have made contact.

12. The computer network appliance of claim 1, wherein the CPU module operates as a stand alone computer.

13. The computer network appliance of claim 1, wherein the CPU module comprises hardware BIOS for configuring the CPU module and instructing a network attached storage (NAS) to locate an operating system (OS) from which to boot.

14. The computer network appliance of claim 1, wherein the CPU module is configured to boot remotely from an OS located in an NAS, and wherein the computer network appliance is free of a local hard disk drive (HDD).

15. The computer network appliance of claim 14, wherein the remote booting of the CPU module allows the CPU module to run different types of operating systems.

16. The computer network appliance of claim 14, wherein effects of the lack of the local HDD include increased mean time between failure (MTBF) and decreased mean time to repair (MTTR) of the computer network appliance.

17. The computer network appliance of claim 1, wherein each of the hot swap connectors of the modules includes an ethernet connection providing communications to all modules attached to the backplane board.

18. The computer network appliance of claim 5, wherein the data input/output connector is a standard ethernet connector allowing heterogeneous CPU modules mounted on a same chassis to communicate with each other.

19. The computer network appliance of claim 1, wherein the ethernet switch module filters communications internal and external to the computer network appliance to limit collisions caused by communications traffic.

20. The computer network appliance of claim 17, wherein the ethernet connection is a switched fast ethernet connection.

21. The computer network appliance of claim 17, wherein different software configurations may be used in the modules free of additional hardware.

22. The computer network appliance of claim 1, wherein the power module comprises dual DC-DC converters performing direct conversion of a facility DC voltage to voltages required for normal operation in the modules.

23. The computer network appliance of claim 22, wherein the DC-DC converters allow the modules to accept DC power directly from a battery backup source free of power inverters.

24. The computer network appliance of claim 22, wherein effects of using the DC-DC converters in the power module include increased MTBF and decreased MTTR in the computer network appliance as compared to a similar computer network appliance using a switched power supply.

25. The computer network appliance of claim 22, wherein the computer network appliance uses less power and generates less heat due to the use of the DC-DC converters in the power module as compared to a similar computer network appliance using a switched power supply.

26. The computer network appliance of claim 20, further comprising a microcontroller module and a dedicated ethernet path, wherein the dedicated ethernet path is separate from the switched fast ethernet connection and provides the microcontroller module with a connection to remotely poll the CPU module, the power module and the ethernet switch module.

27. The computer network appliance of claim 26, wherein the dedicated ethernet path is an I2C bus.

28. The computer network appliance of claim 26, wherein the microcontroller module polls the CPU module on the status of the OS.

29. The computer network appliance of claim 28, wherein the microcontroller module performs a remote reset of the CPU module if the OS of the CPU module is determined to be unstable or have crashed.

30. A method of mounting a hot-swappable module in a computer network appliance, the module comprising a hot swap connector including ground pins, power pins and signal pins, the computer network appliance including a backplane board having hot swap mating connectors, the method comprising:

5 connecting the ground pins of the hot swap connector of the module with
corresponding ground elements of a hot swap mating connector of the backplane board;
 connecting the power pins of the hot swap connector of the module with
corresponding power elements of the hot swap mating connector of the backplane board after
the ground pins have made contact; and
10 connecting the signal pins of the hot swap connector of the module with
corresponding signal elements of the hot swap mating connector of the backplane board after
the power pins have made contact.

31. The method of claim 30, wherein connecting the ground pins first and the signal pins last reduce brown outs in the computer network appliance.

32. A method of hot swapping modules in a computer network appliance comprising
15 (1) a chassis having a plurality of bays for different modules, (2) a backplane board having a
plurality of mating connectors, (3) a power connector and (4) a data input/output connector,
the method comprising:

 placing a module having a hot swap connector in a corresponding bay of the chassis;
20 and

 inserting the module into the chassis by connecting the hot swap connector with a
mating connector of the backplane board,

 wherein the power connector and the data input/output connector remain connected in
the computer network appliance during mounting of the module.

33. The method of claim 32, further comprising removing the module from the chassis by disconnecting the hot swap connector from the mating connector of the backplane board, wherein the power connector and the data input/output connector remain connected in the computer network appliance during removal of the module.

5 34. A method of remotely booting a CPU module in a computer network appliance, comprising:

locating an OS in an NAS to boot the CPU module; and
remotely booting the CPU module using the located OS,
wherein the computer network appliance is free of a local HDD in remotely booting
10 the CPU module.

35. The method of claim 34, wherein the remote booting of the CPU module allows the CPU module to run different types of operating systems.

36. The method of claim 34, wherein effects of the lack of the local HDD include increased MTBF and decreased MTTR of the computer network appliance.

15 37. A method of using a power module including DC-DC converters in a computer network appliance, comprising:

converting an input voltage to desired operational voltages of the computer network appliance; and

accepting DC power directly from a battery backup source free of power inverters.

20 38. The method of claim 37, wherein the MTBF of the computer network appliance increases due to the use of the DC-DC converters in the power module.

39. The method of claim 37, wherein the computer network appliance uses less power and generates less heat due to the use of the DC-DC converters in the power module.